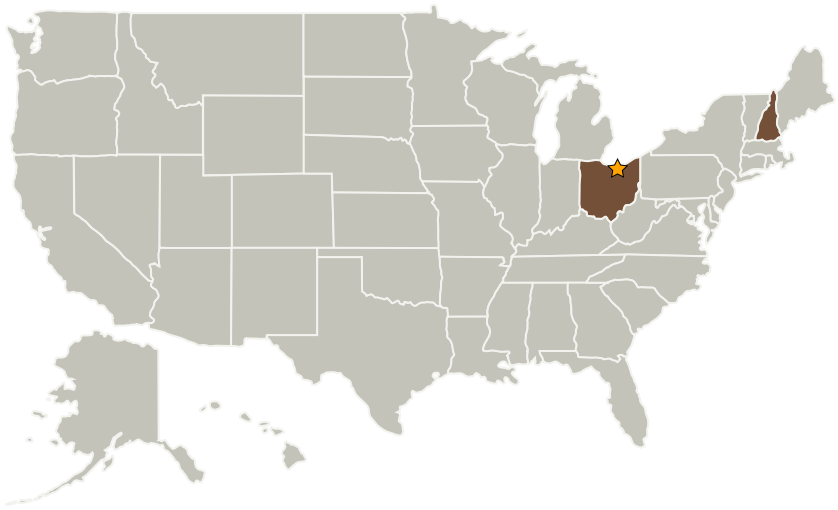
Advanced Radiative Emitters for Radioisotope Thermophotovoltaic Power Systems, Phase I

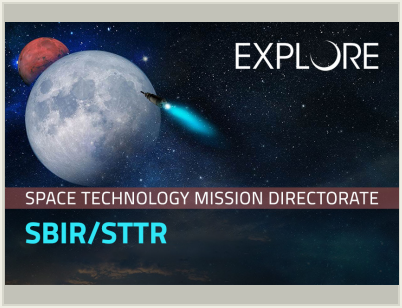
Completed Technology Project (2009 - 2010)

Project Introduction

Radioisotope Power Systems (RPS) are critical for future flagship exploration missions in space and on planetary surfaces. Small improvements in the RPS performance, weight, size, and/or reliability can have a dramatic effect on the scientific capability of the vehicle and the overall mission costs. Radioisotope Thermophotovoltaic (RTPV) energy converters are a particular type of RPS that directly convert the heat produced by a General Purpose Heat Source (GPHS) to electrical power using a specialized Photovoltaic (PV) cell. A key element in an RTPV system is the radiative emitter that converts GPHS thermal energy to radiative energy that illuminates the PV cell. In this project, Creare and the Massachusetts Institute of Technology (MIT) propose to develop an advanced, 2-D, photonic crystal radiative emitter that is optimized for RTPV systems. The emitter will provide high emittance in the bandgap of the PV cell with low emittance elsewhere that, when coupled with advanced PV cell filter technology, will provide high system efficiency. In Phase I, we will design the emitter and fabricate test samples, which will be fully characterized for high-temperature emittance and durability. We will also assess the impact of this new emitter on the overall RTPV system design and performance.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Creare LLC	Supporting Organization	Industry	Hanover, New Hampshire

Primary U.S. Work Locations	
New Hampshire	Ohio

Project Transitions

January 2009: Project Start

January 2010: Closed out

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Richard Kaszeta

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.2 Energy Storage
    - TX03.2.2 Electrochemical: Fuel Cells